

# OPERATOR'S MANUAL

# 2XXX-XXX9-XXX

INCLUDING: APPLICATION, LUBRICATION, INSTALLATION & SERVICE

RELEASED: 9-14-92  
REVISED: 5-25-10  
(REV. C)

## ECONOMAIR SERIES CYLINDERS



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.**

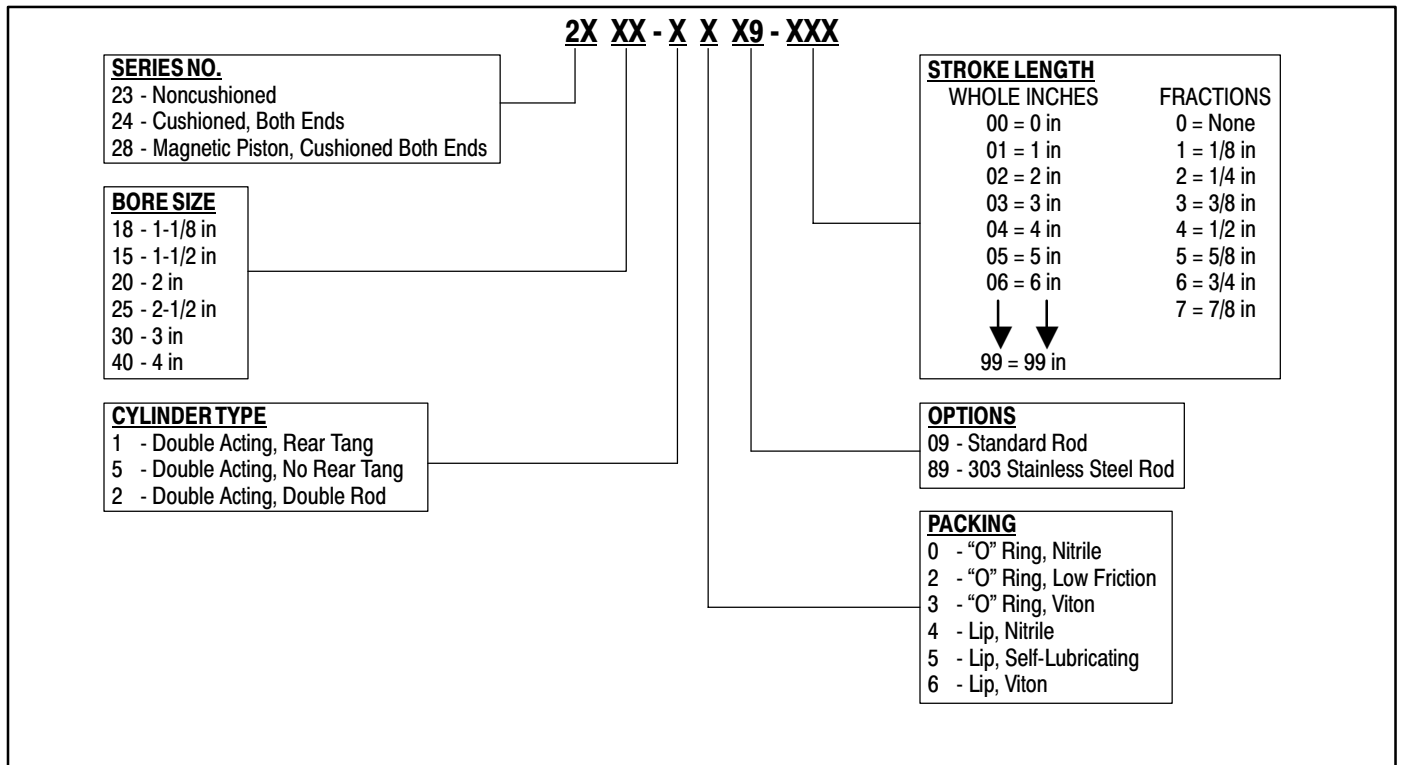
It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.



Rated Pressure: 200 PSI (14 Bar) Maximum

Temperature Ratings: 0° to 180° F (-18° to 82° C)

### MODEL DESCRIPTION CHART



# Warnings and Service Information

## WARNINGS:

Improper application, installation, service or maintenance of ARO® cylinders may create a hazardous condition, which may in turn cause bodily injury as well as shortened product life. Contact The Aro Corporation for special applications.

## ECONOMAIR CYLINDER APPLICATION

- Economair cylinders are a series of round line repairable cylinders designed for medium to heavy duty pneumatic applications.
- The operating pressures are 200 p.s.i.g. - pneumatic and 200 p.s.i.g. - non-shock hydraulic with hydraulic packing option.
- Economair cylinders are available in 6 bore sizes: 1-1/8", 1-1/2", 2", 2-1/2", 3" and 4".
- Options include : 6 mounting styles, magnetic pistons, cushioned and non-cushioned and numerous packing options.

## CUSHIONS

24 and 28 series cylinders are cushioned models. Cushions are protective devices used to extend cylinder life and should not be used to decelerate loads.

Cushioning on all bores, except the 1-1/8", are equipped with an adjustable needle valve in the head and cap to provide adjustment of the cushion effect - clockwise rotation increases cushioning, counterclockwise rotation decreases cushioning. After adjustment, tighten retaining nut to lock into position. CAUTION: Do not disengage cushion needle from head or cap while cylinder is under pressure.

## OPERATION AND MAINTENANCE

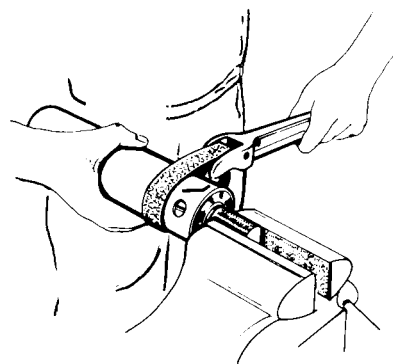
Pneumatic cylinders should be lubricated to provide maximum cycle life. Economair cylinders are lubricated with Shell Darina, EP grade, no. 2 grease during assembly at our factory in Angola, Indiana. Factory lubrication will provide a satisfactory amount of cycle life if no additional lubrication is provided. However, we recommend lubrication for any pneumatic system and suggest that you follow the guidelines for types of lubricants which are outlined in all of our catalogs (reference catalog 0020-M).

Periodic maintenance must be performed to assure maximum product life. Disassembly for cleaning, inspection, and relubrication can be performed any time equipment is idle for a short period of time. All metal parts should be cleaned with a non-flammable solvent. All rubber parts should be thoroughly washed with soap

and water. Cleaned parts should be rinsed and dried with low pressure air. Any parts which are worn or damaged should be replaced. Selected parts and seals are available in repair kit form.

## DISASSEMBLY

Clamp head by nose or tang flats with port in a vertical position at top of cylinder.



Remove all fittings, rotate barrel counterclockwise with a strap wrench one full turn. Locking wire will feed out of slot during turning. At the completion of revolution, remove retaining wire, wiggle barrel and slide from head.

## ASSEMBLY

Verify that all seals are in the correct position and that the rod and piston seals have been properly lubricated with Shell Darina, Ep grade no. 2 grease or equivalent.

Slide piston rod in head (be sure not to damage "U" cup in head), then slide barrel over piston onto head. Avoid damaging piston seals or head "O" ring. Clamp head by nose or tang on flats with port in a vertical position.

Align port and hole in barrel; insert retaining wire tap in hole in head in feed slot. Rotate barrel with strap wrench clockwise one revolution, until port and hole align; retaining wire will feed as barrel turns.

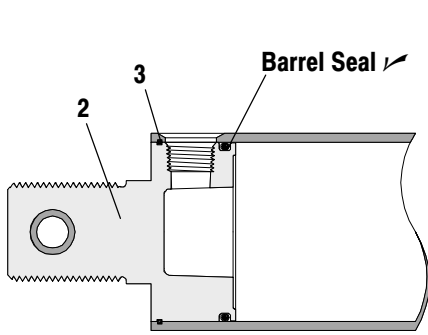
The assembled cylinder can now be tested for leaks and proper operation.

1. Alternately apply 90 p.s.i.g. air pressure to each of the cylinder ports and test for internal leaks across the piston and external leaks at the barrel seals and the rod seals.
2. Test for proper cycling at 20 p.s.i.g. supply.

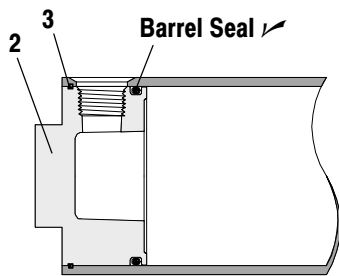
# PARTS LIST

## SERIES 23 CYLINDERS

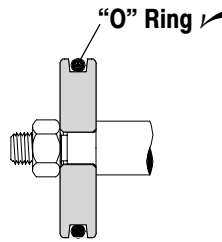
### DOUBLE ACTING, SINGLE ROD END



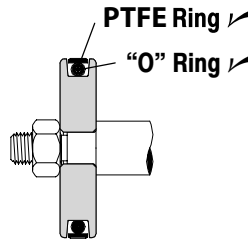
MODELS: 23XX-1XX9-XXX



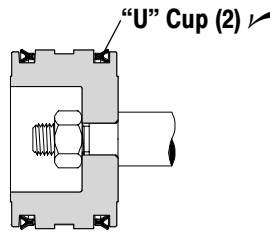
MODELS: 23XX-5XX9-XXX



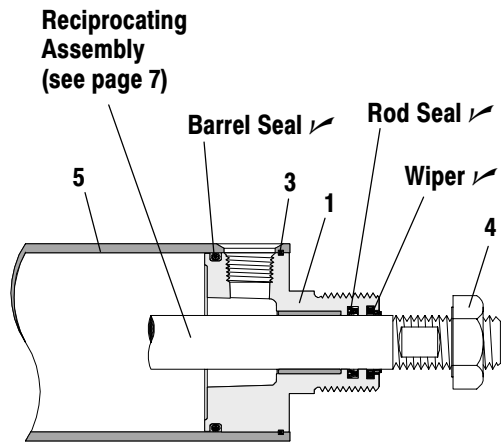
MODELS:  
23XX-X0X9-XXX  
23XX-X3X9-XXX



MODELS:  
23XX-X2X9-XXX



MODELS:  
23XX-X4X9-XXX  
23XX-X5X9-XXX  
23XX-X6X9-XXX



☆ Moderately lubricate barrel I.D. and all seals with Shell Darina EP Grade #2 Grease.

✓ Included in Seal Kit (see page 7)

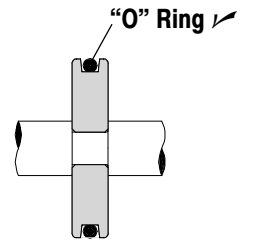
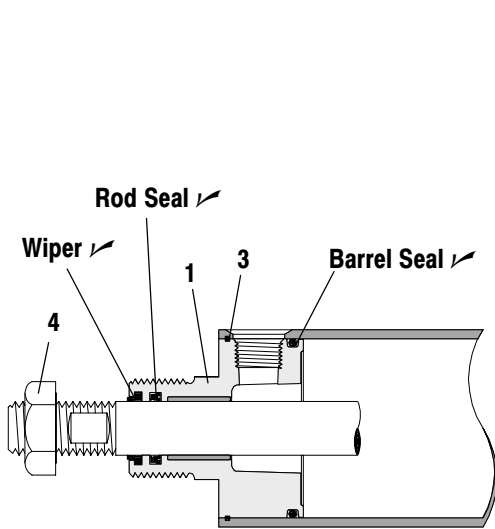
| PARTS LIST |                                    |     |           |           |           |           |           |           |
|------------|------------------------------------|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| ITEM       | DESCRIPTION                        | QTY | 1-1/8"    | 1-1/2"    | 2"        | 2-1/2"    | 3"        | 4"        |
| 1          | Head                               | (1) | 5002      | 118308    | 118319    | 118330    | 118340    | 118350    |
| 2          | Cap (23XX-1)                       | (1) | 5003      | 5105      | 5205      | 118334    | 118344    | 118354    |
|            | Cap (23XX-5)                       | (1) | 5058      | 5158      | 5258      | 118337    | 118347    | 118357    |
| 3          | Feed Ring Wire                     | (2) | 5012      | 5112      | 5212      | 116750    | 5312      | 5412      |
| 4          | Nut                                | (1) | Y12-106-C | Y12-108-C | Y12-110-C | Y12-112-C | Y12-112-C | Y12-116-C |
| * 5        | Barrel (23XX-X0, 23XX-X2, 23XX-X3) | (1) | 5501-XXX  | 5608-XXX  | 5708-XXX  | 6008-XXX  | 5808-XXX  | 5908-XXX  |
|            | Barrel (23XX-X4, 23XX-X5, 23XX-X6) | (1) | 20866-XXX | 20867-XXX | 20868-XXX | 20869-XXX | 20870-XXX | 20871-XXX |

\* Specify Stroke Length

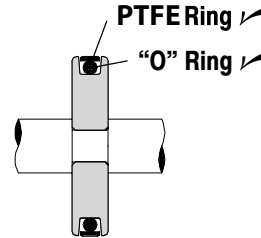
# PARTS LIST

## SERIES 23 CYLINDERS

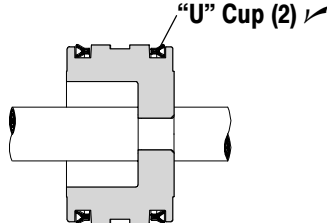
### DOUBLE ACTING, DOUBLE ROD END



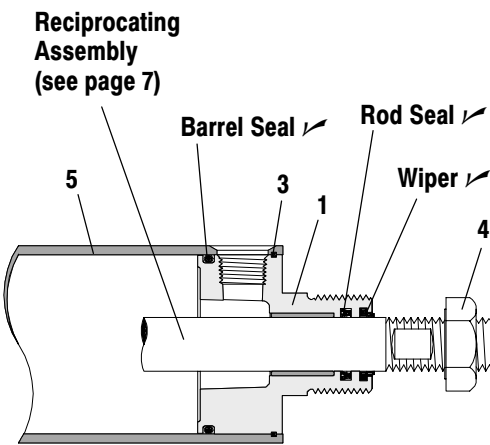
**MODELS:**  
23XX-20X9-XXX  
23XX-23X9-XXX



**MODELS:**  
23XX-22X9-XXX



**MODELS:**  
23XX-24X9-XXX  
23XX-25X9-XXX  
23XX-26X9-XXX



☆ Moderately lubricate barrel I.D. and all seals with Shell Darina EP Grade #2 Grease.

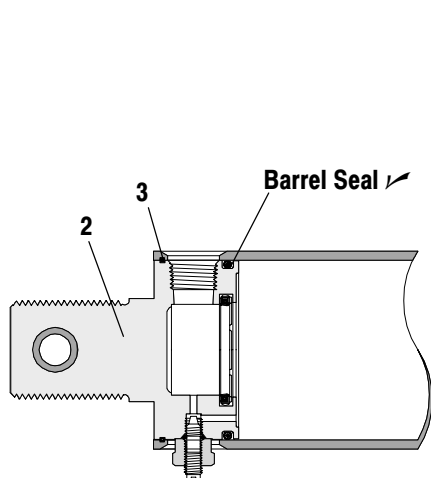
✓ Included in Seal Kit (see page 7)

| PARTS LIST |                                    |     |           |           |           |           |           |           |
|------------|------------------------------------|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| ITEM       | DESCRIPTION                        | QTY | 1-1/8"    | 1-1/2"    | 2"        | 2-1/2"    | 3"        | 4"        |
| 1          | Head                               | (2) | 5002      | 118308    | 118319    | 118330    | 118340    | 118350    |
| 3          | Feed Ring Wire                     | (2) | 5012      | 5112      | 5212      | 116750    | 5312      | 5412      |
| 4          | Nut                                | (2) | Y12-106-C | Y12-108-C | Y12-110-C | Y12-112-C | Y12-112-C | Y12-116-C |
| * 5        | Barrel (23XX-20, 23XX-22, 23XX-23) | (1) | 5501-XXX  | 5608-XXX  | 5708-XXX  | 6008-XXX  | 5808-XXX  | 5908-XXX  |
|            | Barrel (23XX-24, 23XX-25, 23XX-26) | (1) | 20866-XXX | 20867-XXX | 20868-XXX | 20869-XXX | 20870-XXX | 20871-XXX |

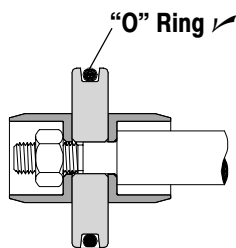
\* Specify Stroke Length

# PARTS LIST

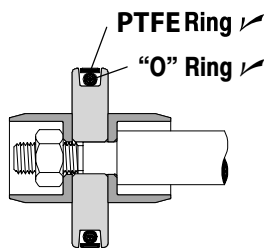
## SERIES 24 & 28 CYLINDERS DOUBLE ACTING, SINGLE ROD END



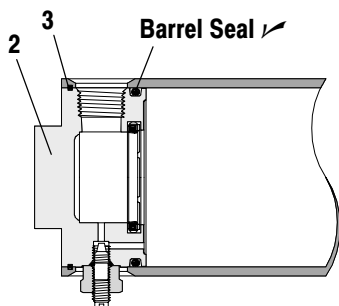
MODELS: 24XX-1XX9-XXX  
28XX-1XX9-XXX



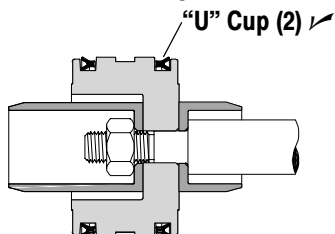
MODELS:  
24XX-X0X9-XXX  
24XX-X3X9-XXX



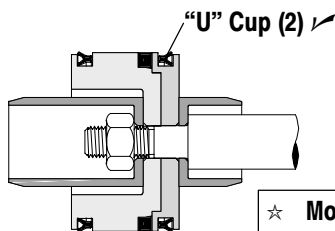
MODELS:  
24XX-X2X9-XXX



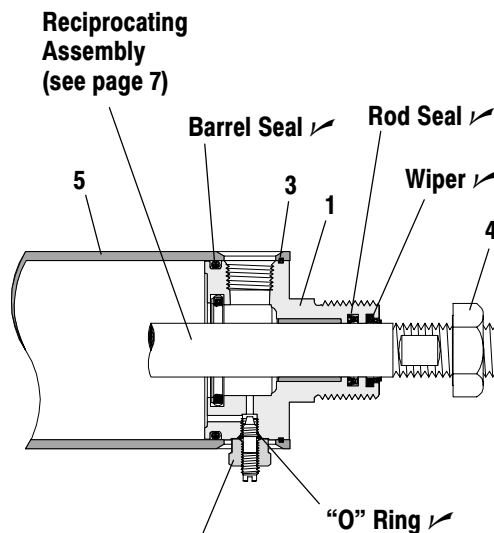
MODELS: 24XX-5XX9-XXX  
28XX-5XX9-XXX



MODELS:  
24XX-X4X9-XXX  
24XX-X5X9-XXX  
24XX-X6X9-XXX



MODELS:  
28XX-X4X9-XXX  
28XX-X5X9-XXX



Reciprocating  
Assembly  
(see page 7)

Cushion Screw Kit  
119315-1 (Nitrile)  
119315-2 (Viton)

☆ Moderately lubricate barrel I.D., O.D. of cushion bosses  
and all seals with Shell Darina EP Grade #2 Grease.

✓ Included in Seal Kit (see page 7)

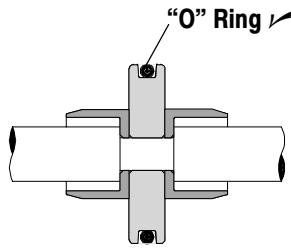
### PARTS LIST

| ITEM | DESCRIPTION                               | QTY | 1-1/8"    | 1-1/2"    | 2"        | 2-1/2"    | 3"        | 4"        |
|------|---|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 1    | Head                                      | (1) | 5052      | 118309    | 118320    | 118331    | 118341    | 118351    |
| 2    | Cap (24XX-1, 28XX-1)                      | (1) | 5053      | 118312    | 118323    | 118335    | 118345    | 118355    |
|      | Cap (24XX-5, 28XX-5)                      | (1) | 5059      | 118315    | 118326    | 118338    | 118348    | 118358    |
| 3    | Feed Ring Wire                            | (2) | 5012      | 5112      | 5212      | 116750    | 5312      | 5412      |
| 4    | Nut                                       | (1) | Y12-106-C | Y12-108-C | Y12-110-C | Y12-112-C | Y12-112-C | Y12-116-C |
| * 5  | Barrel (24XX-X0, 24XX-X2, 24XX-X3)        | (1) | 5501-XXX  | 5601-XXX  | 5701-XXX  | 6001-XXX  | 5801-XXX  | 5901-XXX  |
|      | Barrel (24XX-X4, 24XX-X5, 24XX-X6, 28XX-) | (1) | 20866-XXX | 20872-XXX | 20873-XXX | 20874-XXX | 20875-XXX | 20876-XXX |

\* Specify Stroke Length

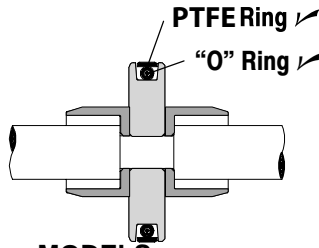
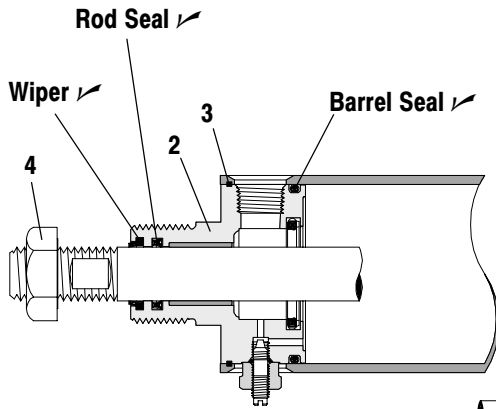
# PARTS LIST

## SERIES 24 & 28 CYLINDERS DOUBLE ACTING, DOUBLE ROD END

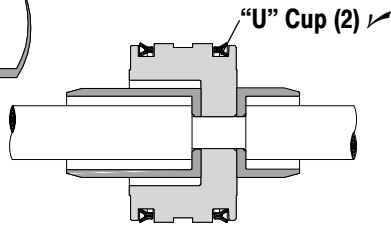


**MODELS:**  
24XX-20X9-XXX  
24XX-23X9-XXX

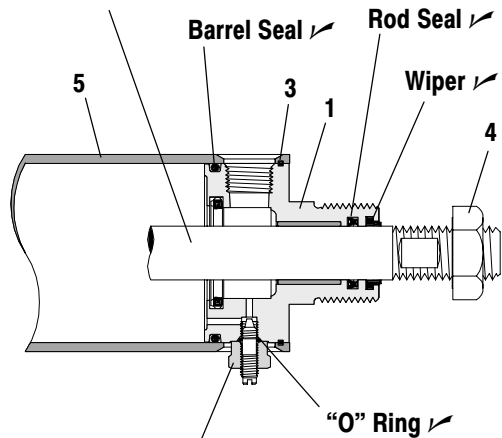
Reciprocating  
Assembly  
(see page 7)



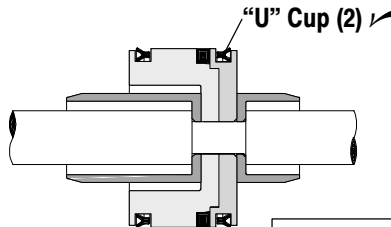
**MODELS:**  
24XX-22X9-XXX



**MODELS:**  
24XX-24X9-XXX  
24XX-25X9-XXX  
24XX-26X9-XXX



**Cushion Screw Kit**  
119315-1 (Nitrile)  
119315-2 (Viton)



**MODELS:**  
28XX-24X9-XXX  
28XX-25X9-XXX

☆ Moderately lubricate barrel I.D., O.D. of cushion bosses and all seals with Shell Darina EP Grade #2 Grease.

✓ Included in Seal Kit (see page 7)

| PARTS LIST |   |     |           |           |           |           |           |           |
|------------|---|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| ITEM       | DESCRIPTION                               | QTY | 1-1/8"    | 1-1/2"    | 2"        | 2-1/2"    | 3"        | 4"        |
| 1          | Head                                      | (1) | 5052      | 118309    | 118320    | 118331    | 118341    | 118351    |
| 2          | Cap                                       | (1) | 5052      | 118310    | 118321    | 118332    | 118342    | 118352    |
| 3          | Feed Ring Wire                            | (2) | 5012      | 5112      | 5212      | 116750    | 5312      | 5412      |
| 4          | Nut                                       | (2) | Y12-106-C | Y12-108-C | Y12-110-C | Y12-112-C | Y12-112-C | Y12-116-C |
| * 5        | Barrel (24XX-20, 24XX-22, 24XX-23)        | (1) | 5501-XXX  | 5601-XXX  | 5701-XXX  | 6001-XXX  | 5801-XXX  | 5901-XXX  |
|            | Barrel (24XX-24, 24XX-25, 24XX-26, 28XX-) | (1) | 20866-XXX | 20872-XXX | 20873-XXX | 20874-XXX | 20875-XXX | 20876-XXX |

\* Specify Stroke Length

# ECONOMAIR RECIPROCATING ASSEMBLY

RA 2X XX - X X X - XXX

| SERIES NO.                                |
|---|
| 23 - Noncushioned                         |
| 24 - Cushioned, Both Ends                 |
| 28 - Magnetic Piston, Cushioned Both Ends |

| BORE SIZE     |
|---------------|
| 18 - 1-1/8 in |
| 15 - 1-1/2 in |
| 20 - 2 in     |
| 25 - 2-1/2 in |
| 30 - 3 in     |
| 40 - 4 in     |

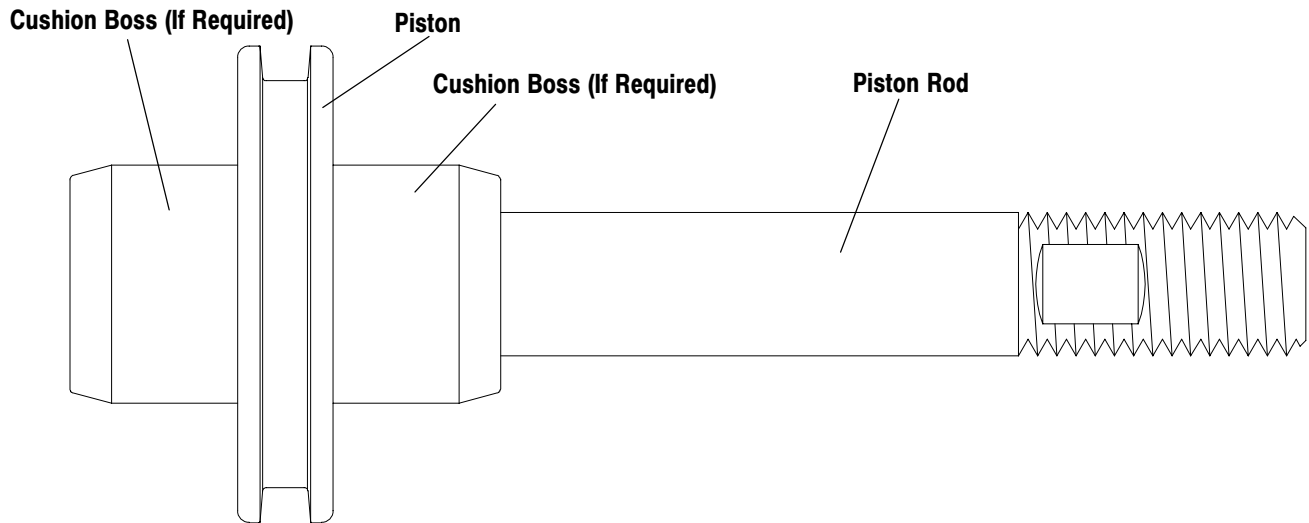
| CYLINDERTYPE                             |
|--|
| 1 - Double Acting (Cylinder Types 1 & 5) |
| 2 - Double Acting, Double Rod            |

| STROKE LENGTH |            |
|---------------|------------|
| WHOLE INCHES  | FRACTIONS  |
| 00 = 0 in     | 0 = None   |
| 01 = 1 in     | 1 = 1/8 in |
| 02 = 2 in     | 2 = 1/4 in |
| 03 = 3 in     | 3 = 3/8 in |
| 04 = 4 in     | 4 = 1/2 in |
| 05 = 5 in     | 5 = 5/8 in |
| 06 = 6 in     | 6 = 3/4 in |
| 99 = 99 in    | 7 = 7/8 in |

| OPTIONS                     |
|-----------------------------|
| 0 - Standard Rod            |
| 8 - 303 Stainless Steel Rod |

| PACKING                       |
|-------------------------------|
| 0 - "O" Ring (Packings 0 & 3) |
| 2 - "O" Ring, Low Friction    |
| 4 - Lip (Packings 4, 5 & 6)   |

NOTE: Reciprocating assembly is furnished assembled with all required components, less seals. It is recommended that new seal kits be used when replacing reciprocating assemblies. See below for Seal Kit requirements.



## SEAL KITS

RK 2X XX - X X

| SERIES NO.                                 |
|--|
| 23 - Noncushioned                          |
| 24 - Cushioned, Both Ends (Series 24 & 28) |

| BORE SIZE     |
|---------------|
| 18 - 1-1/8 in |
| 15 - 1-1/2 in |
| 20 - 2 in     |
| 25 - 2-1/2 in |
| 30 - 3 in     |
| 40 - 4 in     |

| PACKING                    |
|----------------------------|
| 0 - "O" Ring, Nitrile      |
| 2 - "O" Ring, Low Friction |
| 3 - "O" Ring, Viton        |
| 4 - Lip, Nitrile           |
| 5 - Lip, Self-Lubricating  |
| 6 - Lip, Viton             |
| 8 - Lip, Hydraulic         |

| CYLINDERTYPE                             |
|--|
| 1 - Double Acting (Cylinder Types 1 & 5) |
| 2 - Double Acting, Double Rod            |

## Provenair™ and Economair™ Cylinder

The Aro Corporation ("ARO") warrants to the user purchaser of the ARO Provenair and Economair cylinders ("Cylinder") that the Cylinder be free of defects in material and workmanship for a period of five (5) years from the date of purchase.

ARO will repair or replace, at its election, any Cylinder which is found upon its inspection to be defective during the period prescribed above. The Cylinder must be shipped prepaid to ARO factory or ARO Customer Service Center together with proof of purchase.

This warranty does not apply to failures or defects occurring as a result of abuse, misuse, negligent repairs, corrosion, erosion and normal wear and tear.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT TITLE), EXPRESSED OR IMPLIED, AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

THE REMEDIES OF THE USER PURCHASER SET FORTH UNDER THE WARRANTY OUTLINED ABOVE ARE EXCLUSIVE AND THE TOTAL LIABILITY OF ARO WITH RESPECT TO THIS TRANSACTION, WHETHER BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE SHALL NOT EXCEED THE PURCHASE PRICE OF THE CYLINDER.

ARO SHALL IN NO EVENT BE LIABLE TO THE USER PURCHASER FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR PUNITIVE DAMAGES ARISING OUT OF THIS TRANSACTION, OR ANY BREACH THEREOF, WHETHER OR NOT SUCH LOSS OR DAMAGE IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE.